

# GEOTECHNICAL DESIGN REPORT

Concrete Safety Barrier at State Route 78
And West Vista Way
Between College Boulevard and Melrose Drive

11/SD/78 PM 3.3 / 5.8/ 11-294501 1100000387

September 3, 2010

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2 7177 OPPORTUNITY ROAD SAN DIEGO, CA 92111

# Memorandum

To:

Mr. Richard Estrada

Date: September 3, 2010

District 11

Senior Transportation Engineer

File: 11-SD-78-PM 3.3/5.8 EA 11-294501

1100000387

From:

DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES

Geotechnical Services

Office of Geotechnical Design - South 2

Subject: Geotechnical Design Report for the Concrete Safety Barrier at State Route 78 and West Vista Way

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Geotechnical Design Report for the Proposed Concrete Safety Barrier at State Route 78 and West Vista Way. This report defines the geotechnical conditions as evaluated from field data and used in the development of the geotechnical design. It provides recommendations and specifications for project design and construction.

OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Ali Lari at (858) 467-6922.

Ali Lari

Transportation Engineer (Civil)

Office of Geotechnical Design - South 2

No. C6584 Exp. 12-31-

cc:

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#### 1.0 EXECUTIVE SUMMARY

Pursuant to the recommendations contained in this report the proposed concrete safety barriers may be constructed using Standard Plan Type 60 and Type 736SV Barrier. These recommendations are presented in detail within this report and may be used for project design and construction.

#### 2.0 INTRODUCTION

Pursuant to your request, Caltrans Office of Geotechnical Design South 2 has provided this Geotechnical Design Report to be used for project design and construction. The proposed project involves construction of two concrete safety barriers between westbound State Route 78 (SR-78) and the adjacent frontage road (West Vista Way) from College Boulevard to Melrose Drive, and one concrete safety barrier between eastbound SR-78 and adjacent frontage roads (Plaza/Hacienda Drive) from College Boulevard to Emerald Drive. Due to the variable grade difference between the freeway and frontage roads, it will be necessary to construct portions of the barriers on pile foundations. The proposed project location is shown on the site plan presented in Figure 1.

#### 3.0 EXISTING FACILITIES.

SR-78 is a six-lane freeway, connecting Interstate 5 (I-5) and Interstate 15 (I-15). East of I-15, SR-78 continues as a two-lane highway to Imperial County and onward to the border of California and Arizona. West Vista Way is adjacent to westbound SR-78 between I-5 and Melrose Drive. Plaza Drive and Hacienda Drive are the frontage roads adjacent to eastbound SR-78. The site plan shows the proposed concrete safety barrier alignments relative to the SR-78 freeway and frontage roads.

#### 4.0 PHYSICAL SETTING

The project lies within a transitional zone of interior inland influence and oceanic influence. The winters are mild and wet and the summers are moderate and dry. The mean yearly rainfall in the project area is 13 inches. Rainfall usually occurs between the months of November and April. Rare tropical storms during summer months can deliver short, intense downpours.

Within the project area the freeway alignment profile is generally level. The topography is hilly to the north with a stream valley to the south. The general drainage trend is from north to south.

Beyond the right-of-way and along the freeway frontage roads the area is moderately to densely developed with residential and light commercial properties. Some agricultural land and open space buffers still exist along the freeway.

There are no man-made or natural features that present any unusual engineering or construction challenges.

#### 5.0 SITE INVESTIGATION

The following subsections describe the investigation conducted for this report:

# 5.1 Pertinent Reports and Archives Review

- 1) Soil and Foundation Information Provided in Advance of the District Preliminary Geotechnical Report for Concrete Safety Barrier by OGDS2 dated February 11, 2009.
- 2) District Preliminary Geotechnical Report for Concrete Safety Barrier by OGDS2 dated March 5, 2009.
- 3) Revision of District Preliminary Geotechnical Report for Concrete Safety Barrier-Location 2, by OGDS2 dated April 21, 2010.

# 5.2 Exploration

Six exploratory borings were conducted on 07/27/2010 and 07/28/2010 along the barrier alignment. The soil borings were advanced into the ground up to a maximum depth of 16.5 feet utilizing a mechanically driven one-inch diameter Soil Probe. Blow counts were recorded at 5-feet intervals. Soil samples were visually classified in the field. No laboratory testing of soil or rock samples was conducted. Descriptions of the subsurface soils encountered as well as stations and offsets of the boring locations are presented in the attached boring records.

In addition to the above 6 borings, 11 exploratory borings were conducted between 01/20/2009 and 01/22/2009 along the barrier alignment. The soil borings were advanced into the ground up to seven feet below existing ground surface utilizing a hand auger. No boring records were prepared for these borings; however, description of the subsurface soils encountered is presented in Table 1.

Soil borings were not advanced into rock. Description of the character of the bedrock encountered was based on observation of rock outcrops in the project area.

A conventional drill rig was not used at this site because traffic control lane closure to facilitate exploration was judged to be impractical. It was determined that subsurface conditions could be accurately characterized by the exploration methods employed.

The approximate boring locations are shown on Figure 1.

#### 6.0 GEOLOGY

Within the project area SR-78 traverses the northern margin of a small alluvial valley formed by the east-west trending Buena Vista Creek. The main valley bottom and smaller tributary valleys

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are underlain by relatively young alluvial soils. The adjacent hilly topography is composed of much older sedimentary formation and granitic rock. The freeway alignment traverses over all three geologic units; therefore, all three geologic units will be encountered in project excavations. The geologic units are described below:

# Ouaternary Alluvium

Weakly consolidated silt, clay, sand, and gravel. These are relatively young stream deposited sediments overlay irregular surfaces of both Santiago Formation and Granitic Bedrock.

### Santiago Formation

Light-colored fine to medium grained weakly indurated sandstone, often containing landslideprone siltstone and claystone. This marine deposited sedimentary unit overlays an irregular surface of granitic bedrock.

# Green Valley Tonalite

Igneous granitic bedrock with fine-grained crystals. The bedrock is often highly weathered and decomposed. Contains abundant zones of fresh and variably fractured hard rock.

# 7.0 GEOTECHNICAL CONSIDERATIONS

The following subsections describe geotechnical characteristics of the project site that may influence preliminary design:

# 7.1 Groundwater

The groundwater table is located at a significant depth relative to the proposed construction and consequently is not anticipated to impact the project.

#### 7.2 Erosion

Existing slopes appear stable against erosion. However it is anticipated that slopes will be graded during construction. Newly graded slopes will be subject to erosion.

#### 7.3 Seismic Hazards

The proposed project features will not be adversely impacted by seismic events.

# 7.4 Slope Stability and Rockfall

Slopes in soil are stable at an inclination of 2:1(H:V). Slopes in rock and formation are stable at an inclination of 2:1 and are likely to be stable at steeper inclinations.

Rockfall potential does not exist on the project.

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#### 7.5 Excavation Characteristics

Alluvium, sedimentary formation, and decomposed granitic rock may be excavated using conventional excavation and augering equipment. Zones of fractured and variously weathered to fresh hard rock will require significantly greater effort to excavate. At hard rock zones, more vigorous excavation methods are likely to include an excavator equipped with a rock breaker and track mounted air percussion drilling. The anticipated depths to rock material as well as rock descriptions are presented in Table 2. It is not anticipated that soil caving will adversely impact barrier foundation construction.

#### 7.6 Embankments

No significant embankment will be placed as part of the project.

### 7.7 Volumetric Stability of Embankment and Sub grade Materials

Significant adverse soil conditions such as expansive or collapsible soils were not identified within the project limits.

# 7.8 Potential Geologic Hazards

No significant geologic hazards were identified within the project area.

# 8.0 HAZARDOUS WASTE POTENTIAL

A hazardous waste site evaluation is beyond the scope of this report. No potentially hazardous waste was encountered during site reconnaissance and site subsurface investigation.

# 9.0 RECOMMENDATIONS AND CONCLUSIONS

### 9.1 Concrete Barriers

Two types of Caltrans Standard Plan concrete barriers, Type 60 and Type 736 SV, are recommended for use at the station intervals shown in Table 3. The recommended concrete barriers and relevant design parameters are presented in the table. The pile length "L", pile spacing "S", and depth to bottom of the barrier "He" correspond to dimensions shown in Caltrans Standard Plans pages B15-6 through B15-8. "He" is estimated as a minimum of one foot.

Type 60 concrete barrier is recommended where there is little to no grade difference between the frontage roads and freeway.

Where there is a grade difference between the adjacent roadways, Type 736 SV barrier should be used. Even though the Standard Plans Type 736 SV barrier is designed to support a soundwall, it may be used for this application where there is no soundwall. The length of the piles has been

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reduced to 7 feet (See Table 3) as a modification to the pile lengths shown on the Standard Plans. The reason for this is the barrier will not be supporting a soundwall and the presence of granitic rock and sedimentary formation at some locations will provide increased lateral resistance. In cases where the grade difference is less than 4 feet and the slope inclination is 2:1 (H:V) or flatter, piles may be eliminated. In that case, "He" should be increased to 4 feet as shown in Table 3.

# 9.2 Erosion Control

Appropriate erosion control measures should be implemented to protect the newly graded slope faces.

# 9.3 Surface Drainage

Concentrated surface water should not be allowed to pond behind the concrete barriers. Concentrated runoff should not be directed to drain over the slopes. Surface water should be contained by appropriate drainage improvements.

#### 9.4 Construction Advisories

The contractor should anticipate difficult drilling conditions as described in section 7.5 and as defined in Table 2.

#### 10.0 DIFFERING SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and location that have been provided by District 11 Design. If any conceptual changes are made during final project design or if site conditions are encountered during construction that are believed to differ from those conveyed in this report, staff from OGDS2 should review the project to provide appropriate recommendations. Any questions regarding the above recommendations should be directed to the attention of Ali Lari, (858) 467-6922 or Brian Himman, (585) 467-4051 at OGDS2.

Table 1

# Subsurface Soil Description

Boring Number	Location and	Soil Description
TIEMBOX	Station	
	2	At surface: Silty Sand (SM), medium dense, brown, fine
HA-09-111		grained. (Fill)
	239+00	At 5 feet: End of drilling.
HA-09-110	3	At surface: Clayey Sand (SC), loose, brown, moist, (Fill) At 3 feet depth: Fat Clay, stiff, black, high plasticity (Alluvium)
	255+00	At 5 feet depth: Silty Sand (SM), dense, light brown, moist.
		End of drilling,
		At surface: Clayey Sand (SC), loose, brown, moist, (Fill)
		At 2 feet depth: becomes medium dense
	4	At 4 feet depth: Sandy Clay (CL), medium stiff, brown
HA-09-109		(Alluvium)
	269+40	At 5 feet depth: Fat Clay, stiff, black, high plasticity
		At 7feet depth: Poorly-graded Sand, dense, light brown,
		fine-grained. End of drilling.
	4	At surface: Fat Clay, stiff, black, moist, high plasticity
HA-09-108		(Alluvium)
	295+00	At 6 feet depth: Siltstone. End of drilling.
	4	At surface: Silty Sand (SM), loose, reddish brown, moist,
HA-09-107	4	fine grained (Fill)
HA-09-107	297+00	At 2 feet depth: becomes dense
	297+00	At 4 feet depth: Igneous rock. End of drilling.
	4	At surface: Silty Sand (SM), loose, reddish brown, moist,
HA-09-106	ļ <del>"</del>	fine-grained, (Fill)
1177-03-100	298+00	At 2 feet depth: becomes dense
•	2,30100	At 3 feet depth: Igneous rock End of drilling.
	4	At surface: Silty Sand (SM), medium dense, reddish brown,
HA-09-105	7	moist, fine-grained
1177-03-103	300+00	At 3 feet depth becomes dense,
	200100	At 5 feet depth: Igneous rock End of drilling.
	4	At surface: Silty Sand (SM), loose, reddish brown, moist,
HA-09-104		fine-grained, (Fill)
1171-03-104	302+00	At 1 foot depth becomes dense
		At 5 feet depth: Igneous rock End of drilling.

Boring Number	Location and Station	Soil Description
	4	At surface: Poorly graded Sand (SP), loose, light brown,
HA-09-103		moist.
	311+00	At 1 foot depth: Igneous rock End of drilling
	4	At surface Poorly graded Sand (SP), loose, gray, moist,
HA-09-102	<u> </u>	Fine-grained, (Fill)
	312+00	At 2 feet depth: becomes dense
	312700 ;	At 4.5 feet: Igneous rock End of drilling.
		At surface: Poorly graded Sand (SP), loose, dark gray,
	4	moist, fine-grained, (Fill)
HA-09-101		At 2 feet depth: Sandy Silt (ML), medium dense, reddish
	331+00	brown, moist, (Alluvium)
		At 6 feet depth: Encountered hard ground. End of drilling.

.

Table 2

Approximate Depths to Rock

BEGIN STATION	END STATION	Depth to ROCK (feet)	ROCK DESCRIPTION
229+00	293÷00	>8	Sedimentary rock, Siltstone poorly indurated
.293+00	295+00	8	Sedimentary rock, Siltstone poorly indurated
295+00	298+00	. 4	Igneous rock, fractured, Moderately weathered to fresh
298+00	300+00	5 ·	Igneous rock, fractured, Moderately weathered to fresh
300+00	307+00	3	Igneous rock, fractured, Moderately weathered to fresh
307+00	320+00	2	Igneous rock, fractured, Moderately weathered to fresh
320+00	326+00	3	Igneous rock, fractured, Moderately weathered to fresh
326+00	335+00	>8	Igneous rock, fractured, Moderately weathered to fresh

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Table 3

# Recommended Concrete Barriers

Location	Begin Station	End Station	Barrier Type	Pile Length (L) Feet	(He) Feet	(S) Feet
2	229+00	240+80	736SV		4	-
2	240+80	245+40	60	_	-	-
2	245+40	252+00	736SV	-	4	-
				-	_	<b>-</b> .
3	246+20	259+00	736SV	-	4	_
						-
4	270+00	271+60	736SV	7	1	10
4	271+60	.274+60	736SV	.=	4	_
.4	274+60	. 291+40	60	-	-	
4	291+40	294+00	736SV	-	4	_
4	294+00	305+00	736SV	7	1	10
4	305+00	305+60	736SV	- <del></del>	4	_
4	305+60	309+60	60	· <b>-</b>	_	_
.4	309+60	310+40	736SV	-	4	_
4	310+40	319+40	736SV	7	1	10
4	319+40	320+60	736SV	-	4	_
4	320+60	326+00	60	-	-	_
4	326+00	328+20	736SV	· <b>-</b>	4	-
4	328+20	335+40	736SV	7	1	10

### SECURE CONTRIBUTION   SECURE CONTRIBUTIO	LOGG!				BEGIN DATE COMPLETION DATE 07/28/10 07/28/10	NA						lortn/Ea		Datun	1)		HOLE ID:				
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DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES DISTRICT COUNTY 11 SD 78 3.3/5.8 294501  DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES PROJECT OF BRIDGE NAME NA SERVICES PROJECT OF BRIDGE NAME NA SERIOGE NAME NA SERVICES SERIOGE SERVICES SERIOGE SERVICES SERVIC	271,3			$\sim$	SEDIMENTARY ROCK (SILTSONE), poorly indurated, gray			02	116									•			
DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES DISTRICT COUNTY 11 SD 78 3,3/5.8 294501 PROJECT OF BRIDGE NAME NA BRIDGE NUMBER PREPARED BY DATE SHEET																					
Boltom of the borehole at 15.5 feet. Boring terminated at planned depth.    18		14	H														•				
DEPARTMENT OF TRANSPORTATION DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES DIVISION OF ENGINEERING SERVICES DISTRICT COUNTY 11 SD 78 3,3/5,8 294501 PROJECT OR BRIDGE NAME NA	267.3	15		_^_					Ref												
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DEPARTMENT OF TRANSPORTATION  REPORT TITLE GDR for Concrete Barrier DISTRICT COUNTY DISTRICT COUNTY DISTRICT COUNTY ROUTE POSTMILE(KP) EA 3,3/5.8 294501  PROJECT OR BRIDGE NAME NA OFFICE OF GROTE-PHNICAL DESIGNASOUTH 2  REPORT TITLE FOR THE POSTMILE(KP) FROJECT OR BRIDGE NAME NA OFFICE OF GROTE-PHNICAL DESIGNASOUTH 2  REPORT TITLE FOR THE POSTMILE(KP) FROJECT OR BRIDGE NAME NA SRIDGE NUMBER PREPARED BY PATE SHEET		17																			
DEPARTMENT OF TRANSPORTATION  REPORT TITLE GDR for Concrete Barrier DISTRICT COUNTY ROUTE POSTMILE(KP) EA 11 SD 78 3,3/5.8 294501  PROJECT OR BRIDGE NAME NA OFFICE OF GEOTECHNICAL DESIGNASOUTH 2  DISTRICT COUNTY ROUTE POSTMILE(KP) EA 294501  PROJECT OR BRIDGE NAME NA DEPORT TITLE DISTRICT COUNTY SPORT OF SECOND OF		18																			
DEPARTMENT OF TRANSPORTATION  GDR for Concrete Barrier  DIVISION OF ENGINEERING SERVICES  DISTRICT COUNTY  ROUTE POSTMILLE(KP) EA  11 SD 78 3,3/5,8 294501  GEOTECHNICAL SERVICES  PROJECT OR BRIDGE NAME  NA  OFFICE OF GEOTECHNICAL DESIGNASOUTH 2 SRIDGE NUMBER PREPARED BY DATE SHEET		.19								•					·					٠	
GDR for Concrete Barrier  DIVISION OF ENGINEERING SERVICES  DISTRICT COUNTY  DIVISION OF ENGINEERING SERVICES  DISTRICT COUNTY  ROUTE POSTMILE(KP) EA  11 SD 78 3,3/5.8 294501  PROJECT OR BRIDGE NAME  NA  OFFICE OF GEOTECHNICAL DESIGNACOUTH 2  BRIDGE NUMBER PREPARED BY DATE  SHEET		20	口	١		<u> </u>	DEC.	D-7													
OFFICE OF GEOTECHNICAL DEPICAL SOUTH 9 SRIDGE NUMBER PREPARED BY DATE SHEET	4				DIVISION OF ENGINEERING SERVICES		GDR f DISTR 11 PROJ	or Con	crele B COUN SD	ITY	ME			ROUT 78	E	POST	AILE(KP)	ËΑ	D-117		
	'			_			BRIDG	SE NUM	MBER rier		PREP.	ARED I	ΒY	DATE 08/03/	10		SHEET	of 1			

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LOGGE A. Lari				07/28/10 07/28/10	NA					ng or N			Datur	n)		HOLE ID:	HD-10-116	
DRILLIN Caltrans	IG CO Drillin	NTRA g Ser	CTOF		BORE 294+0	HOLE 10, 78 (	LOCA	TION (	Station	, Offse	t, and	Line)				SURFACE I 268,6 ft	LEVATION	
DRILLIN Hand dr	IG ME	THO			DRILL	. RIG er WM										BOREHOLE 1,5*	DIAMETER .	
SAMPLI	RTY	PE(S	AND	SIZE(S) (ID)	SPT H	IAMME	R TYP	E		-						HAMMER F	FFICIENCY (ERI)	
BOREH	OLE B	ACK	FILL A	ND COMPLETION	GROU	INDW	ATER	DURI	NG DR	LLING		AFTE	RDRIL	LING (	DATE)	TOTAL DE	TH OF BORING	
Cullings (ii) NOILVATTE 282.8	DEPTH (ft)		Material Graphics	DESCRIPTION	Sample Location	Sample Number 6	Blaws Per 6 in	Blows Per 1.0 ft	Recovery (%)			Ht.		Drilling Method	Casing Depth	10.5 it	REMARKS	
11	日日		Mat		San	San	SE SE	É	<u> </u>	ng.	Moi Con	00 (10 (10 (10 (10 (10 (10 (10 (10 (10 (	She (Isf)	Drill	Cas			
277.8	1 2 3 4 5 6 7 8			SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND			14 18 38	. 54			) V							
272.8	9 10 11 12 13		10.0	SEDIMENTARY ROCK (SILTSONE), poorly indurated, gray			36 52 80	132										
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267.3	15	$\Box$	15.5					Ref					1		ļ			F
	18		-√	Boltom of the borehole at 15,5 feet, Boring terminated at planned depth.	·								,		-			
	19																	
				DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES GEOTECHNICAL SERVICES		GDR f DISTR 11	ICT	LE crete B COUN SD R BRID	TY	ME			ROUTI 78			HOLE ID: IILE(KP)	HD-10-116 EA 294501	
"			-	OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2		BRIDG	SE NUM ele Ban	MBER rier		PREP <i>A</i> A. Lari	RED E	SY.	DATE 08/03/1	10		SHEET 1 oi	1	

LOGGEI A. Lari	DBY			BEGIN DATE 07/28/10		COMPLET 07/28/10	IOI: DATE	ÌNA								Datum	1)		HOLE ID:	HD-10-115	
DRILLIN			CTOR					BORE 298+0	HOLE 10. 85 fe	LOCAT	TION (	Station	, Oftse	t, and l	Line)				SURFACE EI 282.8 ft		
DRILLIN Hand dri	G MET	101						DRILL	RIG										BOREHOLE 1,5"	DIAMETER	
SAMPLE	R TYP	E(S)	AND S	SIZE(S) (ID)				SPTF	IAMME	RTYP	Ē								HAMMER EF	FICIENCY (ERI)	
1" BOREH	OLE BA	CKI	FILL AI	ND COMPLETION	ON			NA GROL	INDWA	TER	DURI	VG DRI	LLING		AFTE	RDRIL	ING (I	DATE)	NA % TOTAL DEP	TH OF BORING	
Cuttings								READ	INGS		Not E	ncounte	ered		Not er	counte	red		5.5 ft		
ELEVATION (ft)	DEPTH (K)		Material Graphics			DESCRIPTION		Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 (t	Recovery (%)	RGD (%)	Maisture Content (%)	Dry/Unit Weight (pcf)	Shear Strength (tst)	Drilling Method	Casing Depth		REMARKS	
282.8		$\exists$	- 1	SILTY SAND (5 fine SAND	SM), estim	aled medium dens	e, reddish brown, dry,						,					•			E
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277.8	_	Ħ	5.0									l .							Hard layer, n	o advancement, move d West, the condition (	the hole
	5	Ħ	~ ]	Fractured IGNE	OUS ROC	CK, gray					Ref								the same.	a vvest, the condition i	emanieu
277.3		H	_√5.5	Boring terminat	lad at 5.5 f	est	<del></del>						<del></del>		_	<del>                                     </del>			<u> </u>		
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1		VIII	eniem.			NSPORTATION			GDR	for Cor RICT	ncrete t	Barrier	•			ROUT	F	POST	HOLE ID: MILE(KP)	HD-10-115 EA	
				DIVISION OF	ENGINEE	RING SERVICES			11		SD		A12=			78	_	3.3/5.	8 .	294501	
4	To His	æ	<b>15</b>	GEOTECHNIC	CAL SERV	ICES			NA	JECT C				-40.							
1				OFFICE OF G	EOTECHN	IICAL DESIGN-SC	UTH 2		BRID	GE NU	MBER		PREF	ARED	BY	DATE			SHEET		

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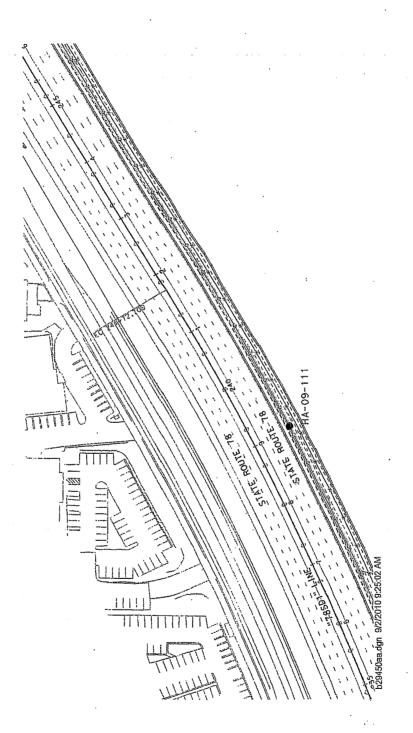
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LOGGE A. Lari				BEGIN DATE 07/27/10	COMPLETION DATE 07/27/10	NA						iorth/E		Datur	n)		HOLE ID:	HD-10-114	
DRILLIN	Drilling	Ser	CTOR			BORE 302+0	HOLE 10, 90 f	LOCA eat Lt.	TION (	Station	, Offse	et, and	Line)				SURFACE I	ELEVATION	
DRILLIN Hand dri	G MET	HOL				DRILL	. RIG er WM	80									BOREHOLE	DIAMETER	
SAMPLE 1"	RTYP	E(S)	AND :	SIZE(S) [ID]				RTYP	E								HAMMER E	FFICIENCY (ER	
BOREH	OLE BA	ACK	ILL A	ND COMPLETION		GROU	NDWA	TER	DURII Not E	NG DR	LLING ered		AFTE Not er	R DRIL	LING (	DATE)	TOTAL DEF	TH OF BORING	
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ELEVATION (ft)	9		ı,		DESCRIPTION	Sample Location	Sample Number	Blows Per 6 In	Blows Per 1.0 ft	Recovery (%)	_	<u>_</u> 2	Dry Unit Weight (pcl)	Shear Strength (tst)	Method	Casing Depth		REMARKS	
TAVE	ОЕРТН (П)		Material Graphics			nple	nple	WS P	Ws P	cover	RQD (%)	Maisture Content (%)	Juli	ear S	Drilling	l guis			
284.4		$\vdash$	E S	SILTY SAND (SM)	estimated medium dense, reddish brown, dry	Sai	Say	- E	<u> </u>	2	8	2 8	6 5	15 St	<u> </u>	ပို့			
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281.4		片	3.0	Fractured IGNEOUS	ROCK, gray	1											hole 10 feet toward Wes	, 30 feet and anoi I, the condition re	her 30 feet mained the
201.4	3	H	<b>ا</b> ⊸√	Boring terminated at	3 faet	<u> </u>										-	same.		
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				DIVISION OF ENGIN	EERING SERVICES		DISTR 11		COUN					ROUT 78		POSTI 3.3/5.8	AILE(KP)	EA 294501 .	
4	der	77	=	GEOTECHNICAL SE	ERVICES .		NA		R BRID										
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LOGGE A. Lan				BEGIN DATE 07/27/10	COMPLETION DATE 07/27/10	BORE	HOLE	LOCA	TION (L	attLor	g or N	orth/E	ast and	Datur	n)		HOLE ID:	HD-10-11:	3
DRILLIN	G CON	TRA	CTOR			BORE	HOLE 10, 76 fe	LOCA	78SD1	Station	, Offse	t, and	Line)				SURFACE I	ELEVATION	
Calirans DRILLIN Hand dr	IG MET	HOL	obe)			DRILL	00, 76 fo - RIG er WM	an									BOREHOLS	EDIAMETER	
SAMPL	ER TYP	E(S)	AND .	SIZE(S) [ID]		SPT	AMME		Έ								HAMMER E	FFICIENCY (ER	)
BOREH	OLE BA	ACK	ILL A	ND COMPLETION		NA GROU	JNDWA	TER	DURIN	IĠ DRI	LLING		AFTE	R DRIL	LING (I	DATE)	NA %	TH OF BORING	1
Cultings		_				READ	T :			counte	red		Not er				6.0 ft		
ELEVATION (II)	рертн (п)		Waterial Graphics		DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 fl	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsi)	Drilling Method	Casing Depth		REMARKS	
302.8		ᆸ	- 1		imated medium dense, light brown, dry,	- s	- S		<u> </u>	DC.	<u> </u>	≥0	으프	<u>0 =</u>					
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300,3	2	H	2.5														Hard ground	i, very slow adva	ncemeni
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	3	H		Boring terminated at 2.	5 feet.														
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				DEPARTMENT OF TR	ANSPORTATION			RTTI									HOLE ID:	HD-10-11:	
A			B29020.**						crete B					ROUT	E	POST	MILE(KP)	EA	,
-				DIVISION OF ENGINE	•		11 -		SD R BRID		ME			78		3,3/5,E	3	294501	
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ł				OFFICE OF GEOTECH	INICAL DESIGN-SOUTH 2		Concr	SE NUI ele Bai	mer mer		A. Lar	AKED i	D (	DATE 08/03/	10		SHEET 1 c	of 1	

LOGGE A. Lari	DBY			BEGIN DATE COMPLETION DATE 07/27/10 07/27/10	NA			•		_		ast and	Datun	1)		HOLE ID: HD-10-112	٦
DRILLIN	Drillin	g Ser	vices		327+7	70, 76 f	LOCA eet Lt.	TION (S 78SD1	Station	, Offse	t, and	Line)				SURFACE ELEVATION 299.0 It	
DRILLIN Hand dri	ven (S	oll Pi	robe)			er WM										BOREHOLE DIAMETER 1.5"	
1"				SIZE(S) (ID)	NA ·	HAMME				•						HAMMER EFFICIENCY (ER <sub>I</sub> ) NA %	_
		ACK	FILL A	ND COMPLETION	GROU	JNDWA INGS	TER	DURIN Not Er	IG DRI	LLING ered		AFTE Not er	R DRIL	LING ( red	DATE)	TOTAL DEPTH OF BORING 16.5 ft	
ELEVATION (ft)	DEPTH (ft)		Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tst)	Drilling Method	Casing Depth	REMARKS	
299.0		Ħ		SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND									i				Ħ
287.5	1 2 3 4 5 6 7 8 8 9 10 11 12 13 14 15 16 17 18		15.0 16.5	loose, olive graylight brown, moistslightly compacted, brown, moist Fat CLAY(CH), estimated stiff, brown, moist, high plasticity SAND SAND Bottom of the borehole at 16.5 feet. Boring terminated at planned depth.			18 36 40 70 	110									
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	1		eners r	DEPARTMENT OF TRANSPORTATION		GDR f	or Con	crete B					BO11-	-		HOLE ID: HD-10-112	
	SECTION AND DESCRIPTION OF THE PERSON OF THE		and i	DIVISION OF ENGINEERING SERVICES		11		COUN SD					ROUT 78	Ė	POST! 3.3/5.8	MILE(KP) EA 294501	
1 0	GEOTECHNICAL SERVICES PROJECT OR BRIDGE NAME NA																
"				OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2		BRIDG	E NUI	MBER		PREP.		BY	DATE 08/03/	10		SHEET	
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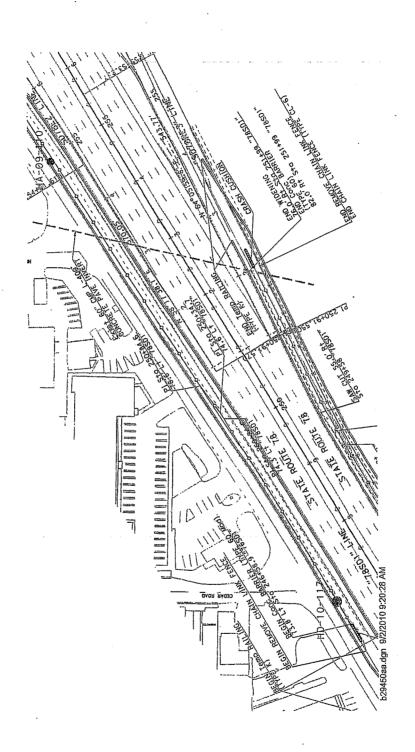
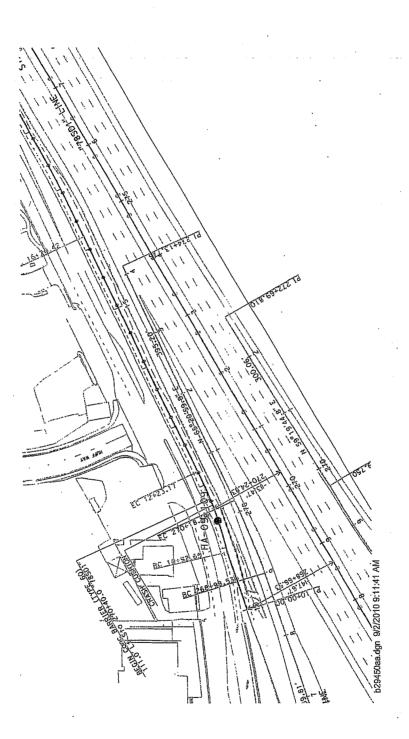
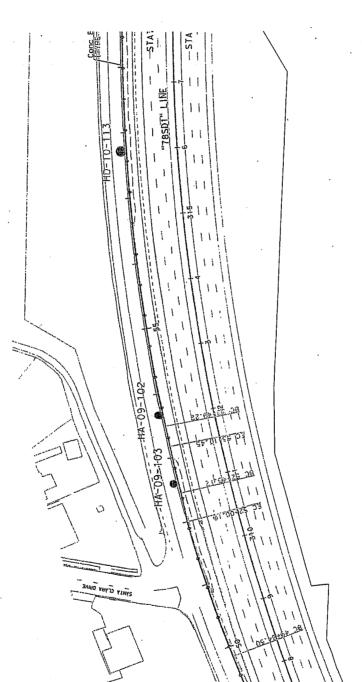


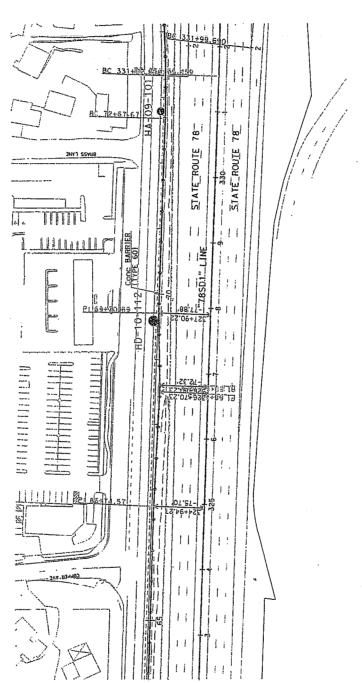
Figure 1





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Figure 1



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